

REMARKS

This application has been reviewed in light of the Office Action dated December 19, 2002. Claims 8-15 are pending in this application, with Claims 8 and 14 in independent form. Claims 1-7 have been cancelled, without prejudice or disclaimer of the subject matter presented therein. Claims 8-15 have been amended to define more clearly what Applicants regard as their invention, in terms that distinguish over the art of record. Favorable reconsideration is requested.

The Office Action includes an objection to the title of the invention for not being descriptive. In response, Applicants have amended the title to --IMAGE PICKUP APPARATUS THAT SUITABLY ADJUSTS A FOCUS--. Applicants believe that this title is clearly indicative of the invention to which the claims are directed. Accordingly, Applicants respectfully request withdrawal of the objection to the title.

The last clause of the abstract of the disclosure was objected to because, as written, it was missing a verb. Applicants have reworded this clause to read --and a first common output line to which signals are read out from the plurality of capacitors included in each of the first and second holding units.-- Applicants believe this clause is now grammatically correct and respectfully request withdrawal of the objection to the abstract.

The drawings were objected to for failing to label Figure 1 "Prior Art" and for mislabeling the "recording medium" in Figure 7. Applicants have labeled Figure 1 --Prior Art-- and have correctly identified the "recording medium" with reference numeral --12-- instead of "2" in Figure 7. Accordingly, Applicants respectfully request withdrawal of the objections to the drawings.

The Office Action, at pages 2 and 3, includes several objections to the specification based on the listed informalities. Applicants have addressed each of the listed informalities with amendments to the specification and respectfully request withdrawal of the objections to the specification. Applicants have also made a few additional changes to pages 9, 10, and 20 of the specification to correct other informalities.

Claim 11 was objected to for failing to provide sufficient antecedent basis for the limitation "the photoelectric conversion." Applicants have amended this limitation in Claim 11 to read --the photoelectric conversion elements.-- Applicants believe sufficient antecedent basis exists for "the photoelectric conversion elements" and respectfully request withdrawal of the objection to Claim 11.

Claims 11 and 13 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The rejection of Claim 11 was based on the same limitation "the photoelectric conversion" discussed above, and Applicants believe that the amendment of this limitation to --the photoelectric conversion elements-- obviates this rejection and respectfully request withdrawal of the Section 112, second paragraph rejection of Claim 11.

Claim 13 was rejected under Section 112, second paragraph, because it was allegedly unclear how microlenses could be provided in the plurality of photoelectric conversion elements. Applicants have amended this claim to recite --microlenses provided one for each of the plurality of photoelectric conversion elements.-- Applicants believe

that this language complies with Section 112, second paragraph, and respectfully request withdrawal of this rejection of Claim 13.

Claims 8-10 and 13 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,451,766 (Van Berkel), and Claims 11, 14, and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Van Berkel in view of U.S. Patent No. 5,949,483 (Fossum et al.). Claim 12 was rejected under Section 103(a) as being unpatentable over Van Berkel.

Applicants submit that amended independent Claims 8 and 14, together with the remaining dependent claims, are patentably distinct from the proposed combination of the cited prior art at least for the following reasons.

Applicants will first address the Section 102(b) rejection of Claim 8 over Van Berkel.

Claim 8 requires an image pickup apparatus including first and second photoelectric conversion units, a first microlens, a second microlens, a first holding unit, a second holding unit, and a first common output line. The first and second photoelectric conversion units each include a plurality of photoelectric conversion elements. The first microlens is provided for the first photoelectric conversion unit, for focusing light onto the plurality of photoelectric conversion elements included in the first photoelectric conversion unit. The second microlens is provided for the second photoelectric conversion unit, for focusing light onto the plurality of photoelectric conversion elements included in the second photoelectric conversion unit. The first holding unit is adapted to hold signals from the first photoelectric conversion unit, the first holding unit including at least the same

number of capacitors as the number of the plurality of photoelectric conversion elements included in the first photoelectric conversion unit. The second holding unit is adapted to hold signals from the second photoelectric conversion unit, the second holding unit including at least the same number of capacitors as the number of the plurality of photoelectric conversion elements included in the second photoelectric conversion unit. Also, signals from the plurality of capacitors included in the first and second holding units, respectively, are read out sequentially to the first common output line. Additionally, the signals from the first photoelectric conversion unit are transferred to the first holding unit through a first switch and the signals from the second photoelectric conversion unit are transferred to the second holding unit through a second switch.

Important features of Claim 8 include the signals from the first photoelectric conversion unit transferred to the first holding unit through a first switch, and the signals from the second photoelectric conversion unit transferred to the second holding unit through a second switch. Support for these features can be found in the specification at least at page 10, line 11, to page 11, line 7, which is described in reference to Figure 2. This portion of the specification states, in part, that “if the selection switch 304 and the load current source 311 are ON, amplification signals based on the signal from the photodiode 301 are outputted to the vertical output lines 310, 319. If the switches 314, 322 are then turned on, the amplification signals outputted to the vertical output line[s] 310[, 319] are transmitted to the capacitors 312, 320.” In other words, the signal from the photodiode (included in the definition of a photoelectric conversion element) 301 of the pixel (included in the definition of a photoelectric conversion unit) 309, on the left-hand side of Figure 2, is transferred through the switch 314 to the capacitor 312. (It is to be

understood, of course, that the scope of Claim 8 is not limited to the details of this embodiment, which is referred to only for purposes of illustration.)

As a disclosure of photoelectric conversion units and holding units according to the present invention, the Office Action refers to Figures 1 and 3, reference numerals 4 and 4a of Van Berkel. (See page 4 of the Office Action). However, Van Berkel states that in Figure 3, “[e]ach photodiode 4 is shown in parallel with a capacitor 4a which in this case represents the parasitic or self-capacitance of the diode 4 but which may also include an additional capacitor to improve the dynamic range of the detector.” (Col. 5, lines 11-15). In contrast, the present invention transfers signals from the photoelectric conversion unit to the holding unit through *switches*. Since the capacitor 4a is in parallel with the photodiode 4, Van Berkel is not understood to transfer a signal from the photodiode 4 to the capacitor 4a through a switch. Therefore, Applicants submit that a person having ordinary skill in the art would not find anything in Van Berkel that would teach or suggest that the signals from the first photoelectric conversion unit are transferred to the first holding unit through a first switch and the signals from the second photoelectric conversion unit are transferred to the second holding unit through a second switch, as claimed in Claim 8.

Accordingly, Applicants submit that Claim 8 is patentable over Van Berkel and respectfully request withdrawal of the Section 102(b) rejection.

Applicants will now address the Section 103(a) rejection of Claim 14 over Van Berkel in view of Fossum et al.

~~Claim 14 requires an image pickup apparatus including an image pickup~~
area, a first microlens, a second microlens, and a common output line. The image pickup

area includes a plurality of first photoelectric conversion elements and a second photoelectric conversion element. The first microlens is provided for the plurality of first photoelectric conversion elements included in the image pickup area. The second microlens is provided for the second photoelectric conversion element included in the image pickup area. Also, a signal from the plurality of first photoelectric conversion elements and a signal from the second photoelectric conversion element are read out to the common output line.

Important features of Claim 14 include the first microlens provided for the plurality of first photoelectric conversion elements included in the image pickup area, and the second microlens provided for the second photoelectric conversion element included in the image pickup area. Support for these features can be found in the specification at least at page 20, lines 15-24, which states that:

[i]n FIG. 8, a region 32 in an image pickup area 31 is used for distance measurement and image pickup, and other region in the image pickup area 31 is used only for image pickup. According to the present embodiment, each pixel in the region 32 is composed of a pixel whose photoelectric conversion element is divided into a plurality of parts (painted over with black in FIG. 8). Each pixel in the other region in the image pickup area 31 is composed of a pixel whose photoelectric conversion element is not divided.

In other words, a pixel in the black painted region 32 has a plurality of photoelectric conversion elements, as shown in Figure 9, which is described at page 20, line 25 to page 21, line 13 of the specification. Figure 9 also shows a single microlens provided for the plurality of photoelectric conversion elements of a pixel in the black painted region 32 of Figure 8. A pixel in the white painted region of Figure 8 has a single photoelectric

conversion element, as shown in Figure 11, which is described at page 22, lines 6-11 of the specification. Figure 11 also shows a single microlens provided for the single photoelectric conversion element of a pixel in the white painted region of Figure 8. (It is to be understood that the scope of Claim 14 is not limited to the details of this embodiment, which is referred to only for purposes of illustration.)

Another important feature of Claim 14 is that a signal from the plurality of first photoelectric conversion elements and a signal from the second photoelectric conversion element are read out to the common output line. Support for this feature can be found in the specification at least at page 21, line 13, to page 22, line 5, and page 22, lines 11-20 which is described in reference to Figures 10 and 12. Figure 10 shows an equivalent circuit of a pixel in the black painted region 32 of Figure 8 that has a plurality of photoelectric conversion elements (501, 502). Figure 12 shows an equivalent circuit of a pixel in the white painted region of Figure 8 that has a single photoelectric conversion element (701). Both Figures show that the signals from the photoelectric conversion elements are read out by the vertical signal line 508. (As stated earlier, the scope of Claim 14 is not limited to the details of this embodiment, which is referred to only for purposes of illustration.)

As a disclosure of microlenses according to the present invention, the Office Action refers to the lens elements 6, shown in Figure 1 of Van Berkel, and the microlenses 115, shown in Figure 5B of Fossum et al. Regarding the outputting of signals, the Office Action points to drive circuits 12 and 14, shown in Figure 3 of Van Berkel. (See page 7 of the Office Action).

Although Van Berkel describes at column 2, lines 62-64 “an array 5 of lens elements 6 with each lens element 6 being associated with at least one imaging element 4,”

and even if Figure 5B of Fossum et al. were deemed to show a microlens 115 covering multiple pixels, Applicants have not found anything in these references that would teach or suggest having one microlens cover multiple photoelectric conversion elements and another microlens cover a single photoelectric conversion element, wherein a signal from the multiple photoelectric conversion elements and a signal from the single photoelectric conversion element are read out to a common output line. The drive circuits 12 and 14 in Figure 3 of Van Berkel do not show a signal from a group of multiple photoelectric conversion elements and a signal from a single photoelectric conversion element being read out to a common output line. Applicants also have not found anything in Fossum et al. that would teach or suggest such a feature to a person having ordinary skill in the art.

Further, Applicants have not found anything in these references suggesting the desirability of having the combination of both a first microlens provided for a plurality of first photoelectric conversion elements, and a second microlens provided for a second, single, photoelectric conversion element.

Accordingly, Applicants submit that, at least for the reasons discussed above, the proposed combination of Van Berkel and Fossum et al., assuming such combination would even be permissible, would fail to teach or suggest the first microlens provided for the plurality of first photoelectric conversion elements included in the image pickup area, and the second microlens provided for the second photoelectric conversion element included in the image pickup area, wherein a signal from the plurality of first photoelectric conversion elements and a signal from the second photoelectric conversion element are read out to the common output line, as recited in Claim 14. Therefore,

Applicants submit that Claim 14 is patentable over these two patents, taken separately or in

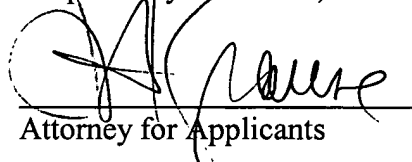
any proper combination and respectfully request withdrawal of the Section 103(a) rejection.

The other rejected claims in this application depend from either of the independent claims discussed above, and, therefore, are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration of the patentability of each claim on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and the allowance of the present application.

Applicants' undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,



Attorney for Applicants

Registration No. 29,613

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

NY_MAIN 335298v1